

Nutrient transport and surface water–groundwater interactions in the tidal zone of the Yamato River, Japan

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Abstract This study examined nutrient transport dynamics and surface water–groundwater interactions in the tidal area of the Yamato River near Osaka, Japan. Spatial variation in radon (²²²Rn) and hydraulic gradient suggest that groundwater discharges to the river in the upstream reaches, but in the zone near the river mouth, river water recharges the groundwater. The deep groundwater depression is likely due to heavy groundwater extraction for use in Osaka up to 1970. Nitrate-nitrogen (NO₃-N) levels were negatively correlated with dissolved organic nitrogen (DON). Based on mass balance calculations, nutrient production occurred in the tidal reach. Approximately 3% of dissolved total nitrogen (DTN) and 9% of dissolved total phosphorus (DTP) loads were attributed to upstream sources.

Key words nutrient; tidal rivers; groundwater; megacity; Yamato River, Japan